

A new species of *Goniozus* Foerster 1851 from  
southern Africa parasitizing sugar cane borer, *Eldana*  
*saccharina* Walker, and taxonomic notes on species  
of the genus in Africa (Hymenoptera: Bethyridae;  
Lepidoptera: Pyralidae)

by

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*Goniozus natalensis* **sp. nov.** is described from material taken in the Republic of South Africa (Natal). The bethyrid is a primary external parasite of the sugarcane borer *Eldana saccharina* Walker on *Cyperus papyrus* Linnaeus. Taxonomic affinities of the new species are discussed and African species currently assigned to *Goniozus* are considered. A replacement name, *Goniozus kiefferi*, is proposed for *Parasierola rostratus* Kieffer 1912. The following NEW COMBINATIONS are proposed: *Goniozus garouae* (Risbec), *G. kabius* (Benoit), *G. leuco-neurus* (Kieffer) and *G. rutshuru* (Benoit).

INTRODUCTION

*Goniozus* Foerster is a large, cosmopolitan genus of bethyrid wasps, the species of which are external parasites of Lepidoptera larvae. Worldwide, I recognize 144 nominal species (Gordh, unpublished); 11 species are known from continental Africa and Madagascar (Table 1). Biological research on *Goniozus* suggests species of this genus may be important in applied biological control programmes against some lepidopterous agricultural pests (Gordh and Hawkins 1981; Legner *et al.* 1982a, b; Gordh *et al.* 1983).

In conjunction with their work on biological control of the sugar cane borer, *Eldana saccharina* Walker (Conlong *et al.*, 1984), D. E. Conlong and his colleagues at the South African Sugar Association Experiment Station, Mount Edgecombe, submitted specimens of *Goniozus* taken at several localities along the eastern coast of Natal, north of Durban, Botswana and Malawi. Study of this material has revealed an undescribed species of *Goniozus*.

***Goniozus natalensis* sp. nov.**, Figs 1-13

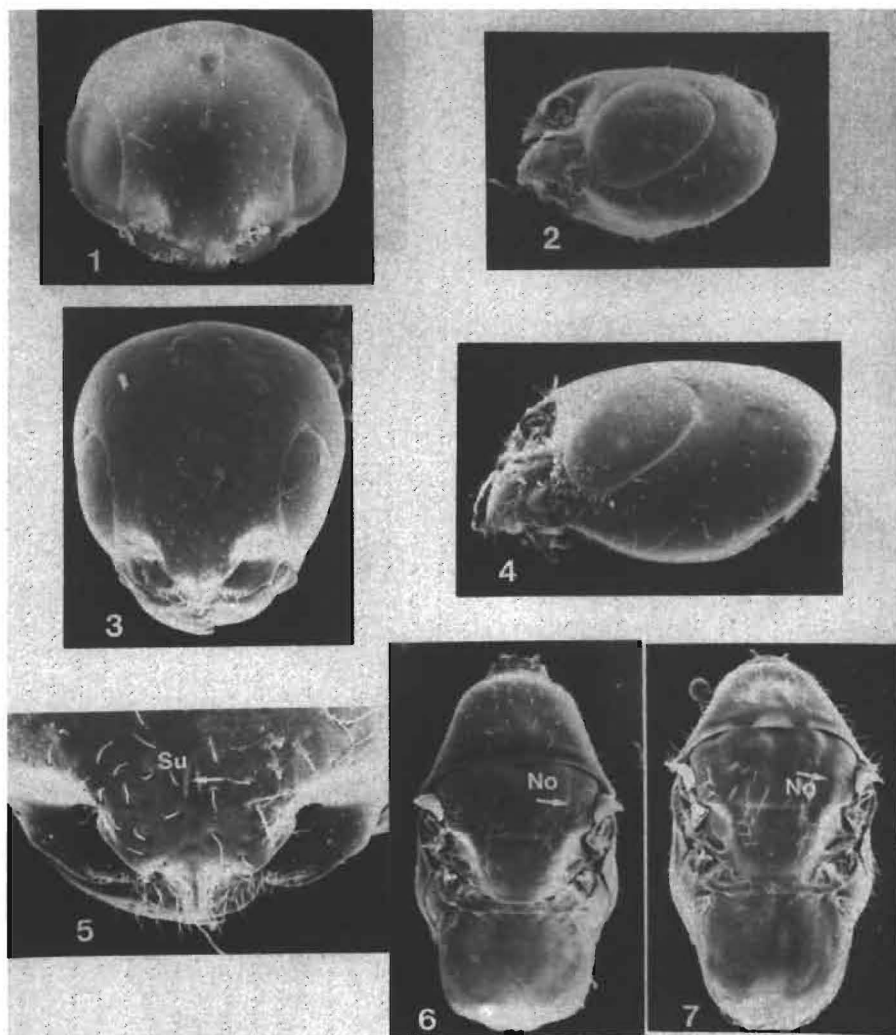
FEMALE 4.88 mm long (holotype). Body jet black. Coloration of appendages depending upon source and intensity of illumination; in fluorescent illumination from a stage illuminator (B&L, Sylvania F4T5/D bulb) coxae dark reddish brown; trochan-

TABLE 1. Characters distinguishing *Goniozus natalensis* **sp. nov.** from known African species of *Goniozus*.

| <i>Goniozus</i><br>species | head   | thorax                              | propodeum                             | other                                   |
|----------------------------|--|-------------------------------------|---------------------------------------|---|
| <i>aethiops</i>            | frontal<br>depressions<br>evanescent             | notaulices<br>evident               | laterally<br>alutaceous;<br>carinate  | propodeal<br>carinae weak               |
| <i>etiellae</i>            | reticulate-<br>rugose                            |                                     | reticulate-<br>rugose<br>carinate     | metasoma red-<br>brown                  |
| <i>garouae</i>             | rugose   |                                     | reticulate;<br>apparently<br>carinate | clypeus<br>angulate                     |
| <i>kabisus</i>             |  | notaulices<br>absent;<br>sculptured | rugulose                              |   |
| <i>leuconeurus</i>         |  |                                     |                                       | areolet closed                          |
| <i>maurus</i>              |  |                                     |                                       | areolet closed                          |
| <i>natalensis</i>          | smooth;<br>frontal<br>depressions<br>conspicuous | smooth;<br>notaulices<br>evanescent | weakly<br>reticulate,<br>ecarinate    | mandibular<br>papillae;<br>areolet open |
| <i>procerae</i>            |  | sculptured                          | reticulate                            | mandibular<br>papillae<br>present       |
| <i>rostratus</i>           |  |                                     |                                       | mandibles, coxae<br>yellow              |
| <i>rutshuru</i>            | alutaceous                                       | alutaceous                          |                                       | clypeus angulate                        |
| <i>similis</i>             | reticulate                                       | reticulate                          | reticulate                            | clypeus angulate                        |

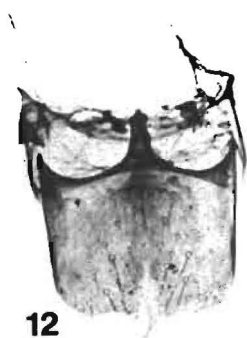
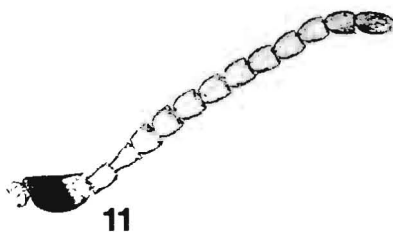
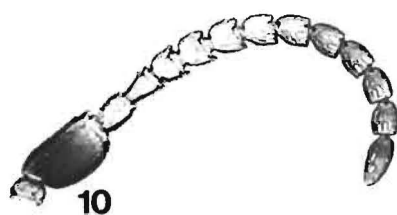
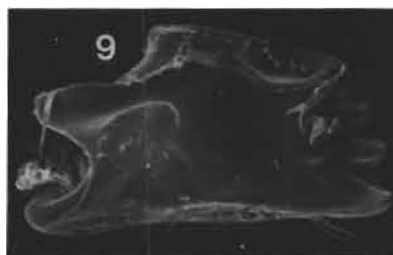
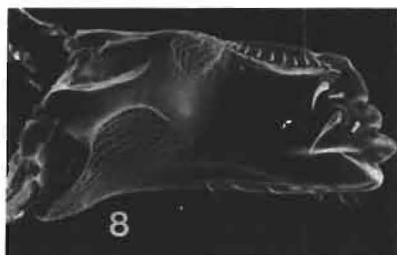
ters paler; femora dark brown to black, apices paler; tibiae, tarsomeres 1-4 tan, fifth tarsomere dusky. Antennal scape predominantly dusky, radicle and apex pale; pedicel and flagellomeres 1-5 concolorous with tibiae, remaining flagellomeres dusky. Wings hyaline.

Head in dorsal aspect (Fig. 3) subquadrate, 1.01 × wider than long. Surface smooth and polished except for weakly reticulate scrobal impression; dorsal margin of scrobal impression ecarinate, but short and rounded. Moderate vestiture of pale, short setae in shallow punctuations; setae most abundant on anterior half of head, conspicuously absent from a spot antieriad of median ocellus and postocular area when head



Figs 1–7. SEM micrograph, *Goniozus natalensis* sp. nov. 1. Head, dorsal aspect, ♂. 2. Head, lateral aspect, ♂. 3. Head, dorsal aspect, ♀. 4. Head, lateral aspect, ♀. 5. Head, clypeus and intertorular sulcus, ♀. 6. Mesosoma, dorsal aspect, ♀. 7. Mesosoma, dorsal aspect, ♂.

viewed in lateral aspect (Fig. 4). Clypeal carina short, rather inconspicuous, ending between toruli, replaced with a shallow median longitudinal furrow about the length of clypeal carina (Fig. 5, Su). Ocelli small, lateral ocelli well removed from very broadly rounded vertexal margin. Head in lateral aspect (Fig. 4), with compound eye  $0.43 \times$  as



Figs 8–13. SEM micrograph, *Goniozus natalensis* **sp. nov.** 8. Mandible, medial aspect, ♀. 9. Mandible, medial aspect, ♂. Photomicrograph, *G. natalensis* 10. Antenna, medial aspect, ♀. 11. Antenna, medial aspect, ♂. 12. Apical gastral sternum, ♂. 13. Genitalia, ♂.

long as head; compound eye asetose; small area adjacent to eye minutely and weakly reticulate; postocular area setose only on ventral half and near vertexal margin. Head in ventral aspect moderately, uniformly and conspicuously setose. Mandible four-

toothed with two large and two small subapical sensory setae on anatomically uppermost teeth (Fig. 8); a line of setae positioned just behind dorsal ridge of mandible in a long depression; sculpture of medial surface of mandible as shown (Fig. 8). Maxillary palpus 5-segmented; labial palpus 3-segmented. Antenna as illustrated (Fig. 10).

Pronotum (Fig. 6) campanulate with dorsal surface smooth, polished and with moderate vestiture of short pale setae on anterior half and sparse vestiture of slightly longer setae on posterior half; lateral surface of pronotum with scattered minute pale setae and reticulate sculpture. Mesoscutum (Fig. 6, No) with notaulices weakly developed but complete; middle portion anteromedially polished, anterolateral (mesad of notaulices) very weakly reticulate; posterior two-thirds of entire mesoscutum setose. Scutellum polished with a few short, pale setae laterad; anterolateral pits very weak and not connected. Propodeum medially polished, laterally weakly reticulate; posterior declivity broadly rounded and not separated from anterior or dorsal face (disc) by a posterolateral carina; carina separating disc from lateral declivity very weakly developed and evident only under certain plays of light. Sternal and ventral facing surfaces of coxae with dense vestiture of long, pale setae.

Metasomal terga uniformly smooth and polished; tergum I asetose, remaining terga sparsely setose laterad with number of setae increasing and their encroachment on medial portion of each segment more evident with each succeeding segment toward apex of metasoma. Sterna with long pale setae arranged in a few loosely arranged transverse rows across each sternum. Sterna weakly reticulate with a longitudinal medial area smooth and asetose.

**MALE.** 3.33 mm long (allotype). Similar to female in coloration, chaetotaxy, sculpture and general habitus. Differing in the following essential details: head in dorsal aspect (Fig. 1) 1.08 × wider than long; head in lateral aspect (Fig. 2) 1.47 × wider than long. Mandible with subapical setae more nearly uniform in size (Fig. 9); line of setae along dorsal margin fewer in number and placed in a shorter, shallow depression (Fig. 9). Clypeus weakly reticulate with margin more truncate; ocelli each at least 3 × diameter of corresponding female ocellus with lateral ocelli near vertexal margin (Fig. 1).

Pronotum (Fig. 7) considerably shorter than pronotum of female.

Postocular area very weakly reticulate. Antenna, apical sternum and genitalia as illustrated (Figs 11, 12, 13). Apex of mandibular teeth frequently reddish brown.

**VARIATION.** The material at hand represents several localities and dates of collection, but the host and host plant remain constant. Conspicuous variation is expressed in colour, particularly in the antenna, where the duskiess varies in intensity and number of apical segments involved (6–13). Similar variation exists in coloration of the tibiae. There is noticeable variation in size among individuals of each sex. Males range in body length from 2.11 to 3.45 mm long. Females vary from 3.88 to 4.95 mm long. Variation in size is probably due to brood size and host weight; some is due to hyperextension of the metasoma. Structurally, the peculiar longitudinal depression found on the head as an extension of the clypeal carina varies somewhat and although always present is difficult to detect on some specimens unless rotated or light is played upon it from different directions. There is variation in the development of the depression near the median ocellus. In some specimens it is nearly absent and seen only when the specimen is rotated in moderately bright light.

**MATERIAL EXAMINED.** Holotype, ♀. Point mounted with the following data: 'SOUTH AFRICA, Natal, Ngwavuma, Kosi Estuary,'/20.xi.1982'/H. Hastings, col./8th Lab Generation ex. *Eldana saccharina* on *Cyperus papyrus*.' Allotype, ♂. Same data as holotype. Paratypes: SOUTH AFRICA: NATAL: 1 ♀, 2 ♂, Ubombo, Lake Sibaya, 14.ix.1982, D. Conlong col.; 5 ♂, same locality 20.i.1983, D. Conlong col.; 3 ♀, 6 ♂, Ngwavuma, Kosi Estuary, 20.xi.1982, H. Hastings col.; 5 ♀, same locality, 19.x.1984, D. Conlong col.; 2 ♀, 1 ♂, Hlabisa, Lake St Lucia, Eastern Shores, 13.viii.1983, D. Conlong col.; 12 ♀, 17 ♂, Hlabisa, Lake Futululu, 21.v.1983, D. Conlong col.; 31 ♀, 2 ♂, Inanda, Mount Edgecombe, SASA Expt. Sta., 19.x.1984, D. Conlong col.; 10 ♀, 4 ♂, Lake Sibaya, Baya, 22.vi.1983, D. Conlong col. BOTSWANA: 2 ♀, Chobe, Kasane, Chobe River, 7.viii.1983, H. Hastings col. MALAWI, Nchalo, Shire River, Alimenda Swamp, 27.ix.1984, D. Conglong col.

Holotype, allotype and six paratypes deposited in the National Insect Collection, Pretoria. Thirty paratypes deposited in the Entomological Collection, University of California, Riverside. Male and female paratypes deposited in California Academy of Sciences, Colorado State University, Fort Collins, U.S.A., United States National Museum, Washington, D.C.; Entomological Laboratories, Ehime University, Matsuyama, Japan. Additional paratypes and specimens examined deposited in the collection of the South African Sugar Association Experiment Station, Mount Edgecombe.

## DISCUSSION

The African species of *Goniozus* are very poorly understood taxonomically and biologically. Girling (1970) reports that an undetermined species of *Goniozus* was recovered at Kawanda, Uganda from *E. saccharina*. In fact the species reported by Girling may be *G. natalensis*. I have been unable to locate vouchers of the Uganda material. I now recognize 11 species of *Goniozus* from Africa (Table 1), but most are known only from fragmentary descriptions and the type-specimens of many species cannot be located. Nevertheless, *Goniozus* is undoubtedly well represented in number of species and will prove rewarding taxonomically and biologically. A revisionary study is definitely required, but it seems best to provide a name rather than wait several years until a monograph can be prepared. *Goniozus natalensis* can be distinguished from other African species of *Goniozus* based on the characters given in Table 1.

The African species of *Goniozus* are too poorly known to arrange in species groups. Many of the types of Kieffer cannot be located and there are many more undescribed species than described species. For the present it seems best to leave the existing names loosely arranged.

*Goniozus aethiops* Evans (in Gordh and Evans 1976: 479-482) is another African species described for purposes of documenting biological control programmes. That species was imported into southern California from Ethiopia for the control of pink bollworm, *Pectinophora gossypiella* (Saunders), but it has not been recovered. Superficially, *G. aethiops* and *G. natalensis* are similar in being large and robust, with the head smooth and shining with a few scattered setigerous punctations. *G. aethiops* differs most conspicuously from *G. natalensis* in the former having the propodeum predominantly weakly reticulate (alutaceous) and with a fine transverse carina separating the disc from the posterior declivity. Virtually nothing is known of this species in its native range, but aspects of its biology have been published from laboratory studies (Gordh and Evans 1976).

*Goniozus etiellae* Risbec is known from two males and six females reared from *Etiella* sp. taken at Garoua, Cameroon. This species was extensively described by Risbec (1955: 259–262) and would appear to be correctly placed in *Goniozus*. The maxillary palpus is purported to be 3-segmented. This should be confirmed.

*Goniozus garouae* (Risbec) **comb. nov.** was based on four females taken in Cameroon. The types have not been located. Nothing has been reported on this species subsequent to its description. A holotype was not designated and, based on the original description (Risbec 1955: 262–264), I suspect the type series is mixed.

*Goniozus kabius* (Benoit) **comb. nov.** was described from two females taken in colonial Belgian Congo (Kivu, Mulungu, Rwindi) (Benoit 1957: 4–5). It lacks notaulices (parapsidal sutures), the thoracic notum is sculptured, and the horizontal face of the propodeum is rugulose. The holotype should be in Tervuren. To my knowledge the species has not been collected elsewhere, and the host remains unknown.

*Goniozus leuconeurus* (Kieffer) **comb. nov.** was briefly described by Kieffer (1914a: 158) from an unspecified number of specimens taken by 'Prof Michaelsen' in colonial German South West Africa. The type material cannot now be located. Kieffer (1914b: 534, 536) subsequently expanded the diagnosis but his efforts are of little help in placing this species. Coloration differences evident through a comparison of descriptions may not be helpful because variation is not recorded. Kieffer's comment that the clypeus is barely perceptible in *G. leuconeurus* may provide the most useful character for distinguishing the species.

*Goniozus maurus* Marshall was characterized in Kieffer's first major work on the Bethyridae (Kieffer and Marshall 1905: 265–266). The type was taken from Algeria and Benoit (1952: 7) subsequently recorded it from 'Cirenaica' (conventionally, Cyrenaica or Barqah, Lybia, a region at 31° 00' N and 22° 30' E). Nagy (1976: 105) described the male from material taken in Moldavia and Romania. He reported the host as pupal *Loxostege sticticalis* Linnaeus (Pyralidae). The host stage should be verified. The holotype of this species should be in Budapest, but Nagy does not mention examining it. If Nagy has correctly identified the female of *G. maurus*, then *G. natalensis* can immediately be distinguished from that species by the closed areolet in the forewing of *G. maurus*, and the conformation of the male genitalia (cf. Nagy 1976: Figs 2, 6).

*Goniozus proceras* Risbec was described from nine females and two males parasitizing *Adelpherupa* sp. and *Salurea* sp. (Pyralidae) at Garoua, Cameroon (Risbec, 1956: 157–160). The illustrations provided with the original description are of little help in placing this species. Risbec mentions 'deux forts mamelons' on the 'base' of the mandible which may be the same structures noted here at the apex of the mandible in *G. natalensis* (Figs 8, 9). (Subsequent study has shown this character is widespread in *Goniozus*.) Descamps apparently collected the original material and later (Descamps 1956: 735) listed *G. proceras* as an internal parasite of larval *Adelpherupa* sp. The host association may be correct, but the report that this species is an internal parasite is erroneous. Other hosts listed by Descamps for this parasite include *Proceras africana* (= *Parerupa africana* (Aurivillius), Crambidae), *Saluria* sp. and *Scirpophaga* sp. Later, Ndoye (1980: 394–400) studied the development of this parasite on *Acigona ignefusalis* Hampson (Pyralidae) and reported that *G. proceras* is an external parasite of the diapausing larva of this moth. Nickel (1964: 69) cites this species as a parasite of stem borers on rice, including *P. africana*, *Saluria* sp., and *Scirpophaga* sp. in Cameroon, but these records refer to Descamp's publication and not original research. Ultimately, this species will be very difficult to place if the type series is not located or topotypical material is not

available. The host association is not useful in placing it because, although the genus is found on many Microlepidoptera, the specificity of most species has not been demonstrated.

*Goniozus rostratus* Kieffer was based on a female taken on Madagascar (Diego-Suarez) (Kieffer, 1905: 33). The holotype cannot be located. Aside from Kieffer's subsequent publications (1908: 5; 1914b: 523, 527–528), which add nothing to the original description, this species remains unknown.

*Parasierola rostrata* Kieffer was proposed for a species taken on the Seychelles Islands (Mahe, Cascade Estate, Mare aux Cochons) (Kieffer, 1912: 47). The type material of this species should be in the British Museum. Evans (1978: 226) synonymized *Parasierola* and *Perasierola* with *Goniozus*. From the original description of *P. rostrata*, Kieffer's placement appears correct. (Kieffer generally assigned species to higher categories consistently, but he tended to propose genera for minor differences or differences not important to classification.) I propose *Goniozus kiefferi* **nom. nov.** in replacement for *Parasierola rostrata* Kieffer 1912, non *Goniozus rostratus* Kieffer 1905. Although I have not seen the holotype, this action seems appropriate and anticipates a world catalogue of the Bethyilidae which is being prepared and for which such action would be desirable. *Goniozus kiefferi* has yellow mandibles and coxae which readily distinguish it from *G. natalensis*.

*Goniozus rutshuru* (Benoit) **comb. nov.** was described in the same publication as *G. kabisus* from material taken at the same locality (Benoit 1957: 5–6). *G. rutshuru* can be distinguished from *G. natalensis* by the triangular clypeus, alutaceous pronotum and mesonotum, lateral margins of propodeal disc clearly separated from lateral face by a carina, and a weakly defined transverse carina separating the disc from the posterior declivity in *G. rutshuru*.

*Goniozus similis* Fouts was described in some detail (Fouts, 1934: 98–99). The reported host was *Thalassodes digressa* (Walker). Paoli (1934: 368) provided additional descriptive notes on this species as *Goniozus* sp. taken in Italian Somalia. Subsequently, Benoit (1956: 560) reported a specimen taken at Rutovu, Ruanda and later (Benoit 1957: 4) gave a more extensive list of collection localities for the species, but the host remains unknown. I have not seen the holotype. It should be in the museum at Genoa.

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Accepted 19 February 1986